
**DRG 154: STOMACH, ESOPHAGEAL
& DUODENAL PROCEDURES**

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EXECUTIVE SUMMARY

BACKGROUND

Diagnosis related group (DRG) 154 pays for major, operating room procedures involving the upper gastrointestinal tract. It carries a high relative weight because it includes a variety of complex surgeries, 2.6876 in Fiscal Year (FY) 1987. Although DRG 154 bills comprise only 0.5% of prospective payment system discharges, the \$381.4 million Medicare paid for them amounts to 1.2% of FY 1987 reimbursement. The National DRG Validation Study suggested that DRG 154 might have high overpayments. This inspection confirms this inference and quantifies the size of Medicare's losses to miscoding.

FINDINGS

- Overall, 20.0 percent of DRG 154 discharges should have grouped to a different DRG. This error rate exceeds the 18.6 percent for all DRGs.
- All DRG 154 assignment errors resulted in the hospitals overpaying themselves. This overpayment percentage significantly exceeds the 59.7 percent for all DRGs.
- These errors caused a projected \$51.0 million overpayment in DRG 154's \$381.4 million reimbursement during FY 1987, a 13.4 percent rate.
- In nearly all errors, the medical records department assigned the wrong ICD-9-CM numeric code to procedures correctly described by the physician on the Attestation Sheet. In a few cases, it assigned incorrect numeric codes to patient diagnoses.
- Most of the discharges incorrectly coded as DRG 154 grouped to other DRGs in Major Diagnostic Category 06, the digestive system. In particular, non-surgical gastrointestinal hemorrhage (DRG 179), peptic ulcer (DRG 177), and gastroenteritis (DRG 182).
- The 1987 requirement that Fiscal Intermediaries verify a sample open biopsy claims from operative reports would detect less than one percent of DRG 154 assignment errors.

RECOMMENDATIONS

- The Health Care Financing Administration (HCFA) should require the peer review organizations (PROs) to further educate hospital medical records departments about the proper codes to use for upper gastrointestinal endoscopies and use of the surgical hierarchy.
- The HCFA should direct the PROs to check a sample of future DRG 154 bills for accuracy.

The HCFA agrees with first recommendation and disagrees with the second recommendation. The Office of Inspector General continues to believe that full implementation of these recommendations would save \$51.0 million annually.

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INTRODUCTION

BACKGROUND

On October 1, 1983, the Health Care Financing Administration (HCFA) began implementing a new system of payment for inpatient hospital services under the Medicare program. The new prospective payment system (PPS) replaced the cost-based reimbursement system. Congress mandated this change because of rapid growth in health care costs, particularly, the rapid increase in payments for inpatient expenses under Medicare.

Under PPS, hospitals received a pre-established payment for each discharge, based upon the diagnosis related group (DRG) to which the discharge groups. The PPS classified discharges into clinically coherent groups which use similar amounts of hospital resources, based on variables such as: diagnosis; evaluation and treatment procedures; and patient age, sex, and discharge status. Each of the 473 DRGs had an associated relative weight, which represented the average cost for hospital care provided to patients with diagnoses grouping to that DRG as a proportion of the cost of the average patient. The hospital received this payment independent of the actual length of hospitalization or cost of treatment for the individual patient. The hospital retained any surplus from patients consuming less than the expected amount of resources, and suffered losses on those patients consuming more.

The shift from cost-based, retrospective reimbursement to prospective payment constituted one of the most dramatic changes in health care reimbursement since the creation of Medicare. A fixed payment per discharge induced hospitals to implement economies and reduce unnecessary services. The total payments to the hospitals provided the same financial resources for patient care. In effect, PPS reversed the financial incentives for hospitals. Where the cost-reimbursement system rewarded longer hospital stays and more costly treatments, PPS rewarded earlier discharges and less costly procedures. One of the first consequences of the new payment system came as a drop in average length of hospital stay for Medicare patients.

PPS vulnerabilities

The advent of PPS also created new opportunities for manipulation or “gaming” to increase hospital revenues from Medicare patients. To protect the integrity of PPS and maintain quality of care Congress established peer review organizations (PROs) to monitor hospital activities.

In addition, the Office of the Inspector General (OIG) conducted the National DRG Validation Study to survey the general accuracy of DRG assignment and quality of care performed by hospitals under PPS. The National DRG Validation Study examined assignment accuracy in over 7000 medical records. The OIG established that PPS assign-

ment errors resulted in \$300 million in overpayments to hospitals and that the majority of overpayments could be traced to assignment errors affecting a small number of DRGs. This report comprises one of a series examining assignment accuracy of one of the DRGs identified as having the highest impact on overpayments under PPS and the greatest potential for cost recovery.

The PPS may create financial incentives for hospitals to manipulate or “game” the payment system in order to receive maximum Medicare reimbursements. The PPS gaming takes two principal forms. “Optimization” strategies adhere to coding rules, but maximize hospital reimbursements by selecting the most expensive among viable alternative principal diagnoses or adding more secondary diagnoses. PPS permits optimization. DRG “creep” results from coding practices which do not conform to coding rules. Sources of DRG creep include:

- Mis-specification of the principal diagnosis, secondary diagnoses, or procedures by the attending physician. The Uniform Hospital Discharge Data Set defines the principal diagnosis as “that condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital for care.”
- Miscoding by the hospital’s medical records department when assigning codes to the diseases or procedures attested to by the attending physician.
- Resequencing of the order of the narrative diagnoses to substitute a secondary diagnosis for the correct principal diagnosis.

PPS claims processing

Under PPS, the hospital files a claim for Medicare reimbursement upon discharging the covered patient. The attending physician attests to the principal diagnosis which caused the patient’s admission to the hospital, secondary diagnoses, and procedures (diagnostic and therapeutic) provided. The medical records department translates the narrative diagnoses of the physician’s attestation statement into numeric codes from the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), and prepares a claim. Fiscal intermediary (FI) organizations, working under contract with HCFA, enter the hospital’s codes into the GROUPER computer program which assigns the appropriate DRG for reimbursement.

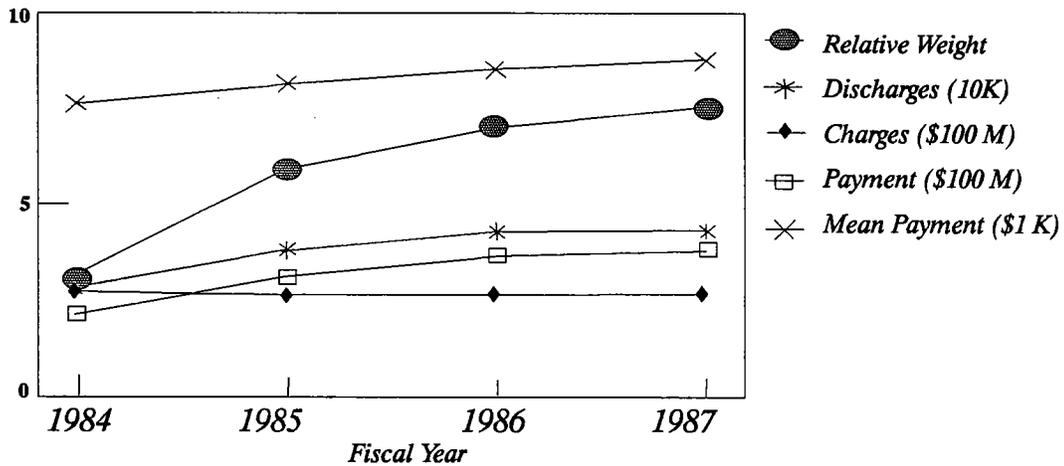
Multiplying the “relative weight” for each DRG by a standardized amount produces the dollar reimbursement for the discharge, as modified by certain hospital-specific factors. The relative weight for a DRG reflects the average cost of its treatment compared to the average cost of treatment of all Medicare discharges. In Fiscal Year (FY) 1985, the standardized amount for a relative weight of 1.0000 totaled \$2985 for urban hospitals and \$2381 for rural hospitals. The relative weight of each DRG varies above or below 1.0000 according to the average amount of hospital resources used by patients in that diagnostic

group. The higher the relative weight, the greater the reimbursement. Mis-assignment of the ICD-9-CM categories, or erroneous assignment or sequencing of patient diagnoses, can therefore have significant financial implications.

DRG 154

This study examines erroneous assignment and gaming in a single DRG: 154 — stomach, esophageal, and duodenal procedures. Being a surgical DRG, assignment to 154 requires both upon (1) a principal diagnosis of upper gastrointestinal disease and (2) a related operating room procedure. Where multiple procedures occur during hospitalization, the “surgical hierarchy” selects the most resource intensive one. Procedures grouping to DRG 154 include removal of the stomach or small intestine, severing the vagal nerve to the stomach, surgical repair of the esophagus, and similar major surgery to the gastrointestinal tract. It does not include non-surgical procedures such as endoscopy through the mouth to examine the upper gastrointestinal tract.

Figure 1: DRG 154 (all PPS hospitals)

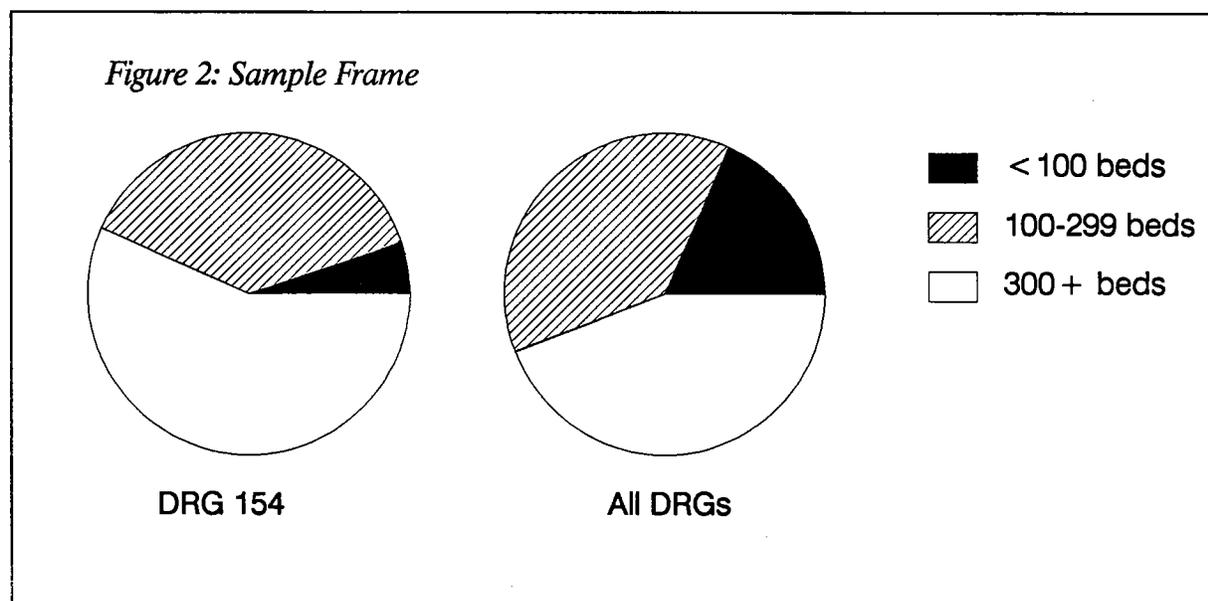


In the National DRG Validation Study, DRG 154 appeared to have a high rate of mis-assignment. Although Medicare pays only about 40,000 such bills annually, they account for a disproportionate 1.2 percent of prospective payment dollars. The OIG therefore initiated this inspection to verify this preliminary impression. DRG 154 appeared particularly vulnerable to mis-assignment and manipulation due to its high relative weight (2.6621 in FY 1985) and concomitant average reimbursement (\$8,198). In addition, DRG 154 carried the highest weight of any DRG in the surgical hierarchy of Major Diagnostic Category (MDC) 06, gastrointestinal diseases. [Appendix A-1]

The DRG 154 excludes most procedures that do not involve cutting into the abdominal cavity. This inspection examined whether miscoding caused less invasive procedures to erroneously group to DRG 154. Since October 1987, the HCFA has required that hospitals submit operating room reports on bills for open biopsies. The FIs verify 10 percent of claims for accuracy of the procedure coded (i.e., whether an open biopsy actually occurred). This requirement checks the accuracy of some DRG 154 bills.

METHODOLOGY

This study examines DRG 154 discharges drawn from a sampling frame originally designed for the National DRG Validation Study. It used a stratified two-stage sampling design based on hospitals to select medical records for review. The first stage used simple random sampling without replacement to select up to 80 acute care, prospective payment hospitals from each of three strata based on bed size: less than 100 beds (small), 100 to 299 beds (medium), and 300 or more beds (large). The second stage of the design employed systematic random sampling to select DRG 154 bills for the period October 1, 1984 to March 31, 1985 from the 239 hospitals selected in the first stage.



The OIG contracted with the Health Data Institute of Lexington, MA to reabstract the entire sample of records. Upon receipt, the contractor “blinded” the ICD-9-CM codes by covering them, and assigned an identification number to each record. An Accredited Record Technician or Registered Record Administrator proficient in ICD-9-CM coding reviewed the entire record to substantiate the principal diagnosis, other diagnoses, and procedures indicated by the attending physician in the narrative attestation form. Any records which did not support the assigned DRG classification went to physician reviewers. The physician reviewers designated the correct UHDDS principal diagnosis, additional diagnoses, and procedures substantiated by the patient records. The

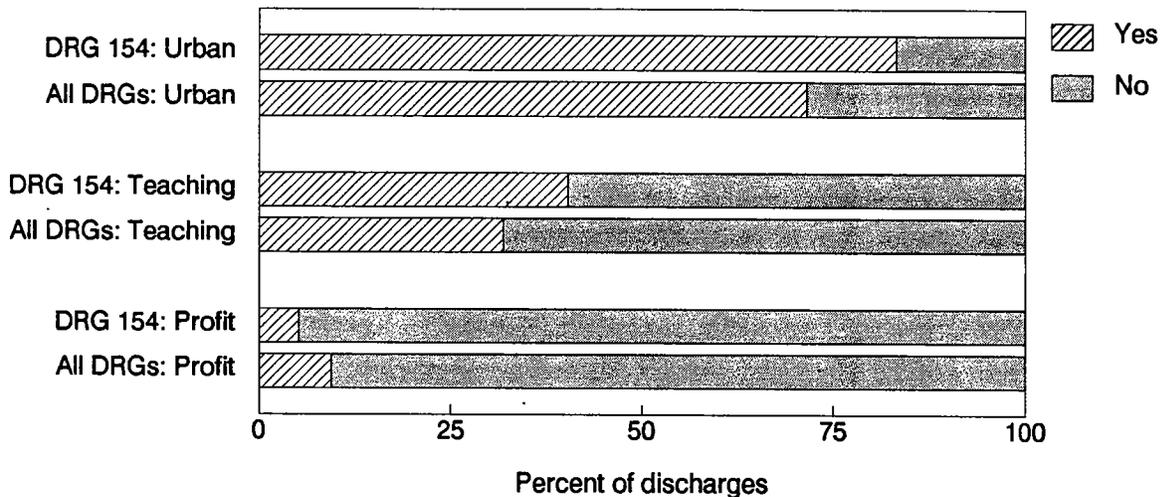
GROUPER computer program processed the reabstracted ICD-9-CM codes to determine correct DRGs. The final report on the National DRG Validation Study presents a full discussion of the record review methodology (available from OIG Public Affairs).

FINDINGS

Sample characteristics

In FY 1985, 38,433 of the 8.3 million prospective payment discharges (0.4 percent) grouped to DRG 154. The National DRG Validation Study established that large and medium sized hospitals submit a disproportionate share of DRG 154 bills. Smaller hospitals may have lacked the facilities to perform the major surgery necessary to group to DRG 154. The bed size trend for DRG 154 differed significantly different from the distribution for all DRGs (Chi-square 4181.6, 2 df, $P < 0.0001$). Discharges from 239 hospitals in the sampling frame exhibited the same proportions as the underlying population. They billed for 222,396 discharges of which 1,162 came from DRG 154. [Appendix A-2]

Figure 3 : Hospital Demography



The two-stage sample design permitted calculation of separate results for Medicare beneficiaries (the probability of something happening to a person) and hospitals (the odds of an event at a particular hospital). The appendices, tables, and charts therefore report individual totals weighted by both discharges and hospitals. When weighted by discharges to approximate the underlying population, DRG 154 bills principally came from urban, nonteaching, and nonprofit hospitals. [Appendix A-3] DRG 154 therefore paralleled the distribution of all PPS discharges, except for having a significantly higher proportion of urban discharges even when controlling for bed size (Mantel-Haenszel Chi-square 3.96, df 1, $P < 0.05$). [Appendix A-4]

Discharge weighted and controlling for bed size, the DRG 154 sample did not differ significantly from all DRGs by age (t test 0.57, $P = 0.35$) or sex (Mantel-Haenszel 1.4, 1 df, $P = 0.23$). [Appendix A-5] However, DRG 154 discharges did have significantly higher

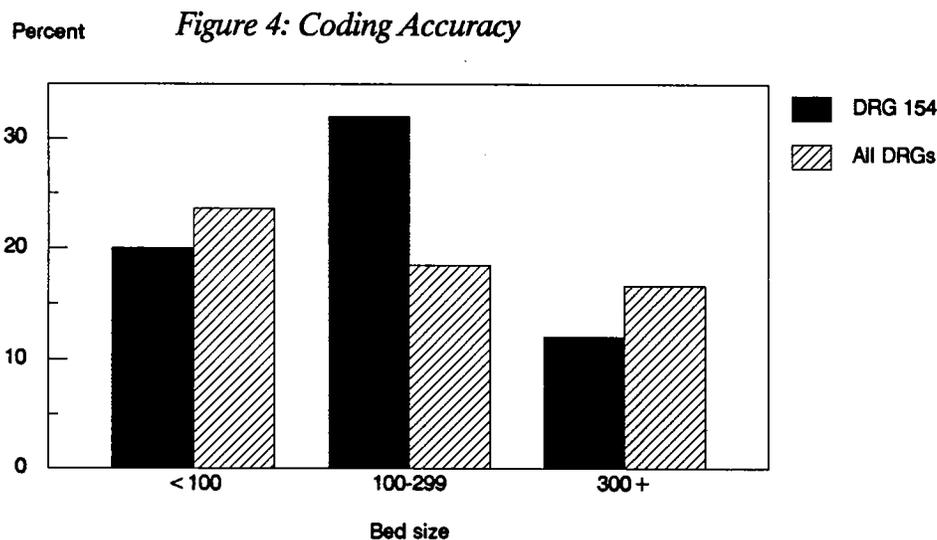
	DRG 154	National DRG Validation	Medicare
Age (year)	74.4	73.6	not available
Sex (% male)	38.5	46.2	42.2
LOS (days)	16.2	7.5	7.8
Payment (\$)	9.0	6.3	2985 urban 2381 rural
Mortality (%)	9.0	6.6	not available
n	75	7,050	8.3 million

lengths of stay (t test 6.80, P) and payments (t test 269.4, P) than the National DRG Validation Study. The samples also had the same mortality rate (Mantel-Haenszel 1.2, 1 df, P = 0.28). [Appendix A-6]

Assignment errors

Reviewers determined that 20.0 percent of discharges should not have grouped to DRG 154. [Appendix B-1]. Medium sized hospitals had the highest rate of assignment errors, but did not significantly exceed the rates for either other sizes of hospitals in this sample (Chi-square 3.0, 2 df, P = 0.22), or for all DRGs from medium sized hospitals (Chi-square 3.0, 1 df, P = 0.08). DRG 154 assignment errors occurred more often in discharges from urban (Mantel-Haenszel 1.1, 1 df, P = 0.30), teaching (Mantel-Haenszel 2.8, 1 df, P = 0.09), and for-profit hospitals (Mantel-Haenszel 0.1, 1 df, P = 0.70); but not at statistically significant rates. [Appendix B-2]

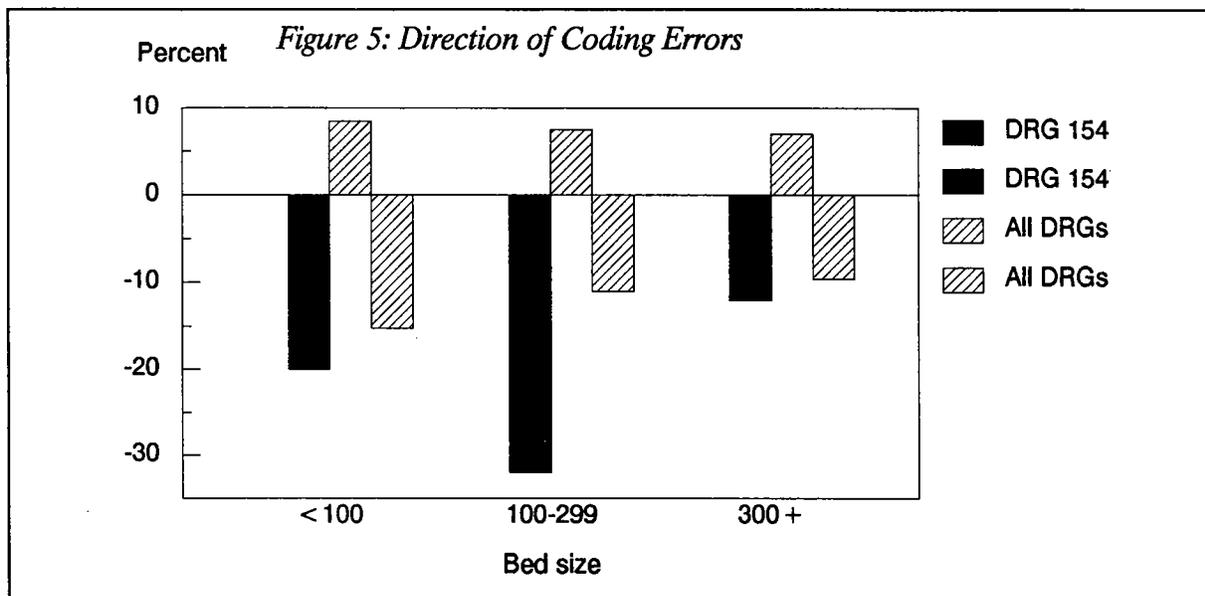
Examination of DRG 154 assignment errors by patient demography, demonstrates that among discharges assigned to DRG 154, those assigned incorrectly had the same average



age; but a substantially lower percentage of males, shorter average lengths of stay, and lower rate of patient mortality. No clear trend association existed between payment, incorrect assignment, and bed size. [Appendix B-3]

Direction of errors

All of the errors in this sample resulted in overpayments to hospitals. Hospitals should have coded and billed these discharges to a DRG with a lower relative weight than DRG 154, which had a relative weight in FY 1985 of 2.6621. [Appendix C-1] The combination of a 20.0 percent error rate and all errors increasing the reimbursement gave DRG 154 an effective overpayment percentage of 20.0, significantly higher than the 11.1 percent of the National DRG Validation Study (Chi-square 4.13, df 1, P < 0.05). [Appendix C-2]



Appendix C-1, which tabulates the direction of DRG 154 errors by hospital demography, shows that half the instances of overpayment came from mid-sized hospitals, largely because they had the highest rate of erroneous bills. [Appendix C-3]

Source of errors

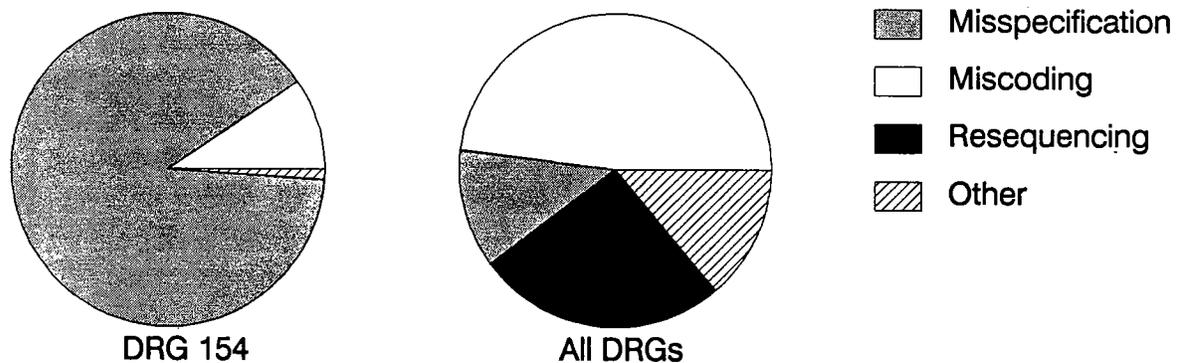
All DRG 154 errors derived from errors in coding as opposed to errors in billing after correct coding. In this inspection, medical records departments incorrectly coded the records as DRG 154, and the hospital billed accordingly. No errors resulted from hospitals incorrectly billing a record which had the correct medical codes. [Appendix D-1]

Reasons for errors

Miscoding errors by the hospital medical records department accounted for 81.2 percent of the errors in DRG 154. Indeed, 62.5 percent of errors resulted from the medical records department assigning the wrong code to a procedure correctly specified in the Attestation Sheet. Another 18.8 percent of errors occurred when the department selected the wrong ICD-9-CM codes for the correct narrative principal or secondary diagnoses. Only 12.5 percent of errors derived from physicians mis-specifying the principal diagnosis. [Appendix E-1] In contrast, the National DRG Validation Study traced the majority of its errors to mis-specification by the attending physician. [Appendix E-3]

In discharges miscoded by the hospital, patients tended to have a higher average age, lower percent of males, and to shorter lengths of stay than discharges in which physicians made narrative errors. In addition to longer hospital stays, the latter had higher average reimbursements. [Appendix E-4]

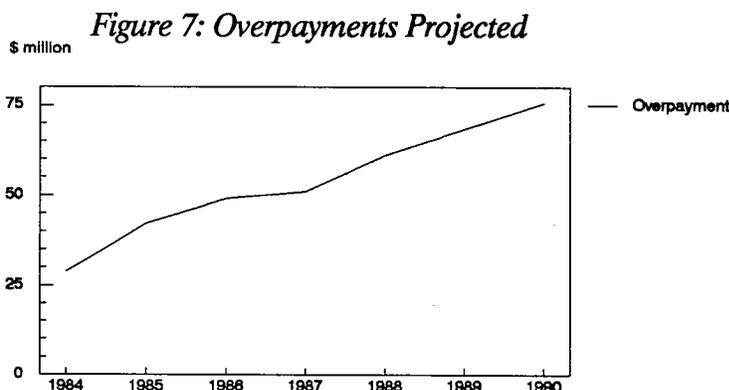
Figure 6: Reasons for Errors



Financial effects

Weighted by discharges, overpayments totaled 14.3 percent of total dollar reimbursement. After reabstraction, the average relative weight for DRG 154 discharges in this sample decreased from 2.6621 to 2.2823, and the total relative weight decreased from 66.6625 to 57.0575. [Appendix F-1] Based on the hypothetical, national, standardized amounts for reimbursement during FY 1985 (\$2985 urban and \$2381 rural), the change in relative weight for discharges in this sample resulted in average overpayments of \$965 to small hospitals, \$1541 to medium sized hospitals, and \$672 to large hospitals on each discharge paid as DRG 154. The bulk of these overpayments went to mid-sized hospitals, which also had the highest rate of coding errors. [Appendix F-2]

Projecting the 14.3% overpayment rate to the entire Medicare population, miscoding of DRG 154 resulted in an estimated \$42.1 million of excessive payments in FY 1985 and increased to \$51.0 million in FY 1987. Extrapolating the rising four year trend for DRG 154 reimbursement implies overpayments of \$75.6 million by FY 1990. [Appendix F-3]



Correct DRG assignments

After reabstraction by reviewers, 93.8 percent of errors grouped to another DRG in MDC 06, diseases and disorders of the digestive system. This recoding assigned 18.8 percent of these discharges to lower weighted surgical DRGs in MDC 06 and 75.0 percent to non-surgical (or medical) DRGs in MDC 06. Medical DRGs usually carry lower relative weights than more resource intensive, surgical conditions. [Appendix G-1]

Of the coding errors, 62.5 percent grouped to only three nonsurgical DRGs: 174 (gastrointestinal hemorrhage), 177 (uncomplicated peptic ulcer), and 182 (esophagitis, gastroenteritis, and miscellaneous digestive disorders). [Appendix G-2]. In 43.8 percent of errors, hospitals billed for various operating room procedures while actually performing endoscopy of small intestine (ICD-9-CM 45.13), a non-operating room procedure carrying a lower relative weight. [Appendix G-3] Analyzed at the level of narrative diagnoses and procedures, other erroneous bills pertained to procedures elsewhere in the gastrointestinal tract or did not relate to the alimentary canal at all. Viewed in conjunction with the high rate of errors due to miscoding of correct narrative diagnoses implies coder confusion about the ICD-9-CM treatment of esophagogastroduodenoscopy and instrumentation. [Appendix G-4]

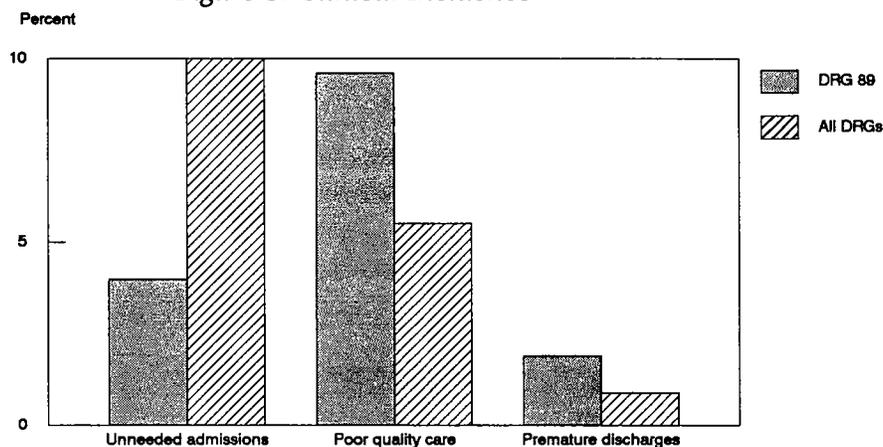
The HCFA's 1987 requirement that operating room reports accompany open biopsy bills could have detected only 6.3 percent of the DRG 154 assignment errors. [Appendix G-5] The other DRG 154 bills listed exclusively ICD-9-CM procedure codes not pertinent to open biopsies. Since the FIs check only 10 percent of open biopsy claims, this process would correct less than one percent of the errors of the type found during this inspection. Turning to ICD-9-CM codes for discharges correctly billed to DRG 154, the majority in-

volved surgical removal of all or a portion of the stomach. Major surgeries of the esophagus, vagus nerve, and peptic ulcer also occurred frequently. Hernia repair and small intestine procedures appeared only rarely in the billing codes.

Clinical review results

Medical reviewers judged only 3.2 percent of discharge weighted cases to be unnecessary ("an admission in which the care received by the patient was either not needed or did not require the use of the inpatient setting"). They occurred in mid-sized and large hospitals. DRG 154 included no premature discharges. [Appendix H-1]

Figure 8: Clinical Incidence



Weighted to represent discharges, only 3.3 percent of this sample, received "quality of care not meeting professional standards." This rate is lower than the 5.5 percent quality problems in the National DRG Validation Study. [Appendix H-2]

RECOMMENDATIONS

- The HCFA should require the PROs to further educate hospital medical records departments about the proper codes to use for upper gastrointestinal endoscopies and use of the surgical hierarchy.
- The HCFA should direct the PROs to check a sample of future DRG 154 bills for accuracy.

The HCFA agrees with first recommendation and disagrees with the second recommendation. The Office of Inspector General continues to believe that full implementation of these recommendations would save \$51.0 million annually.

Appendix A-1: DRG 154 discharges from all PPS hospitals

Fiscal Year	1984	1985	1986	1987
Relative weight	2.6901	2.6621	2.6726	2.6876
Number of discharges	28,272	38,433	42,877	43,255
Total charges (\$000)	314,127	596,540	703,995	759,069
Total reimbursement (\$000)	216,521	315,081	367,303	381,445
Average reimbursement (\$)	7,659	8,198	8,566	8,819

Appendix A-2: DRG 154 sampling frame

Number of discharges	Bed size			Total
	<100	100-299	300+	
Medicare population	2,023	14,609	21,801	38,433
Sample hospitals	54	318	790	1,162
Sampled	25	25	25	75
Sampling fraction [%]	[46.3]	[7.9]	[3.2]	[6.5]

Appendix A-3: DRG 154 hospital demography

Number [percent distribution]	Bed size			Total	Weighted percentage		
	<100	100-299	300+		Sample	Discharge	Hospital
Urban	10 [40.0]	19 [76.0]	23 [92.0]	52	[69.3]	[83.2]	[60.0]
Rural	15 [60.0]	6 [24.0]	2 [8.0]	23	[30.7]	[16.8]	[40.0]
Teaching	3 [12.0]	8 [32.0]	13 [52.0]	24	[32.0]	[40.3]	[20.8]
Nonteaching	22 [88.0]	17 [68.0]	12 [48.0]	51	[68.0]	[57.7]	[75.2]
Profit	3 [12.0]	3 [12.0]	0 [0.0]	6	[8.0]	[5.2]	[10.1]
Nonprofit	22 [88.0]	22 [88.0]	25 [100.0]	69	[92.0]	[94.8]	[89.9]
Total	25 [100.0]	25 [100.0]	25 [100.0]	75	[100.0]	[100.0]	[100.0]

Appendix A-4: DRG 154 hospital demography comparison

Percent distribution		Bed size			Weighted percentage		
		<100	100-299	300+	Sample	Discharge	Hospital
Urban	DRG 154	40.0	76.0	92.0	69.3	83.2	60.0
	All DRGs	19.9	70.2	94.0	62.0	71.4	48.0
Rural	DRG 154	60.0	24.0	8.0	30.7	16.8	40.0
	All DRGs	80.1	29.8	6.0	38.0	28.6	52.0
Teaching	DRG 154	12.0	32.0	52.0	32.0	43.3	20.8
	All DRGs	2.6	18.8	55.2	25.9	31.9	16.2
Nonteaching	DRG 154	88.0	68.0	48.0	68.0	57.7	75.2
	All DRGs	97.4	81.2	44.8	74.1	68.1	83.8
Profit	DRG 154	12.0	12.0	0.0	8.0	5.2	10.1
	All DRGs	9.2	17.5	2.5	9.8	9.4	10.9
Nonprofit	DRG 154	88.0	88.0	100.0	92.0	94.8	89.9
	All DRGs	90.8	82.5	97.5	90.2	90.6	89.2

Appendix A-5: DRG 154 patient demography

	Bed size			Weighted average		
	<100	100-299	300+	Sample	Discharge	Hospital
Age (years)	75.6	74.8	73.6	74.6	74.2	75.0
Sex (% male)	40.0	36.0	40.0	8.7	38.5	38.7
LOS (days)	13.0	13.2	20.0	15.4	17.0	14.2
Payment (\$)	6286	7729	8368	7461	8015	7085
Mortality (%)	12.0	4.0	12.0	9.3	9.0	9.4

Appendix A-6: DRG 154 patient demography comparison

		<u>Bed size</u>			<u>Weighted average</u>		
		<u><100</u>	<u>100-299</u>	<u>300+</u>	<u>Sample</u>	<u>Discharge</u>	<u>Hospital</u>
Age (years)	DRG 154	75.6	74.8	73.6	74.6	74.2	75.0
	All DRGs	76.2	74.0	72.2	74.1	73.6	74.9
Sex (% male)	DRG 154	40.0	36.0	40.0	8.7	38.5	38.7
	All DRGs	43.3	45.4	48.1	45.7	46.2	44.8
LOS (days)	DRG 154	13.0	13.2	20.0	15.4	17.0	14.2
	All DRGs	5.9	7.4	8.3	7.2	7.5	6.8
Payment (\$)	DRG 154	6286	7729	8368	7461	8015	7085
	All DRGs	1849	2923	3807	2860	3115	2508
Mortality (%)	DRG 154	12.0	4.0	12.0	9.3	9.0	9.4
	All DRGs	5.6	6.2	7.0	6.3	6.4	6.0

Appendix B-1: DRG 154 coding accuracy

Number of errors [Rate]	Bed size			Total	Weighted average		
	<100	100-299	300+		Sample	Discharge	Hospital
Urban	2 [20.0]	7 [36.8]	3 [13.0]	12	[23.1]	[22.4]	[24.4]
Rural	3 [20.0]	1 [16.7]	0 [0.0]	4	[17.4]	[7.4]	[15.8]
Teaching	2 [66.7]	5 [62.5]	2 [15.4]	9	[37.5]	[36.0]	[57.2]
Nonteaching	3 [13.6]	3 [17.6]	1 [8.3]	7	[13.7]	[12.1]	[14.1]
Profit	2 [66.7]	1 [33.3]	0 [0.0]	3	[50.0]	[16.2]	[45.3]
Nonprofit	3 [13.6]	7 [31.8]	3 [12.0]	13	[18.8]	[19.6]	[19.3]
Total	5 [20.0]	8 [32.0]	3 [12.0]	16	[21.3]	[20.0]	[22.6]

Appendix B-2: DRG 154 coding accuracy comparison

Error rate		Bed size			Weighted average		
		<100	100-299	300+	Sample	Discharge	Hospital
Urban	DRG 154	20.0	36.8	13.0	23.1	22.4	24.4
	All DRGs	22.5	19.3	16.2	18.0	18.5	20.4
Rural	DRG 154	20.0	16.7	0.0	17.4	7.4	15.8
	All DRGs	23.9	16.6	22.5	21.9	20.6	21.3
Teaching	DRG 154	66.7	62.5	15.4	37.5	36.0	57.2
	All DRGs	20.0	20.9	15.8	17.4	18.5	19.6
Nonteaching	DRG 154	13.6	17.6	8.3	13.7	12.1	14.1
	All DRGs	23.7	17.9	17.6	20.2	18.8	20.2
Profit	DRG 154	66.7	33.3	0.0	50.0	16.2	45.3
	All DRGs	23.8	18.9	18.3	20.3	19.5	21.3
Nonprofit	DRG 154	13.6	31.8	12.0	18.8	19.6	19.3
	All DRGs	23.6	18.4	16.5	19.4	18.5	20.8
Total	DRG 154	20.0	32.0	12.0	21.3	20.0	22.6
	All DRGs	23.6	18.5	16.6	19.5	18.6	20.8

Appendix B-3: DRG 154 coding accuracy by patient demography

		Bed size			Weighted average		
		<100	100-299	300+	Sample	Discharge	Hospital
Age (years)	Correct	76.6	74.4	73.6	74.8	74.1	75.4
	Incorrect	71.4	75.6	73.7	73.9	74.3	73.1
Sex (% male)	Correct	40.0	41.2	45.5	42.4	43.6	41.3
	Incorrect	40.0	25.0	0.0	25.0	11.6	28.8
LOS (days)	Correct	15.2	14.6	21.7	17.4	18.7	16.0
	Incorrect	4.4	10.4	7.7	8.0	8.6	6.9
Payment (\$)	Correct	6144	7893	8535	7539	8164	7092
	Incorrect	6855	7382	7147	7174	7221	7073
Mortality (%)	Correct	15.0	5.9	13.6	11.9	10.7	11.8
	Incorrect	0.0	0.0	0.0	0.0	0.0	0.0

Appendix C-1: DRG 154 overpayments by hospital demography

Number [Percent of errors]	Bed size			Total	Weighted average		
	<100	100-299	300+		Sample	Discharge	Hospital
Urban	2 [100.0]	7 [100.0]	3 [100.0]	12	[100.0]	[100.0]	[100.0]
Rural	3 [100.0]	1 [100.0]	0 [0.0]	4	[100.0]	[43.3]	[84.2]
Teaching	2 [100.0]	5 [100.0]	2 [100.0]	9	[100.0]	[100.0]	[100.0]
Nonteaching	3 [100.0]	3 [100.0]	1 [100.0]	7	[100.0]	[100.0]	[100.0]
Profit	2 [100.0]	1 [100.0]	0 [0.0]	3	[100.0]	[43.3]	[84.2]
Nonprofit	3 [100.0]	7 [100.0]	3 [100.0]	13	[100.0]	[100.0]	[100.0]
Total	5 [100.0]	8 [100.0]	3 [100.0]	16	[100.0]	[100.0]	[100.0]

Appendix C-2: DRG 154 overpayments comparison

Percent of errors		Bed size			Weighted average		
		<100	100-299	300+	Sample	Discharge	Hospital
Urban	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	53.9	60.4	57.0	58.0	57.7	56.5
Rural	DRG 154	100.0	100.0	0.0	100.0	43.3	84.2
	All DRGs	66.5	57.6	65.6	64.7	62.7	63.4
Teaching	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	66.6	59.6	56.6	57.9	59.6	62.8
Non-teaching	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	64.1	59.7	59.0	61.7	60.2	61.9
Profit	DRG 154	100.0	100.0	0.0	100.0	43.3	84.2
	All DRGs	68.0	55.7	63.6	60.7	61.5	63.3
Nonprofit	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	63.7	60.5	57.6	60.9	59.8	61.6
Total	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	64.1	59.6	57.7	60.8	59.6	61.6

Appendix C-3: DRG 154 overpayments by patient demography

		<u>Bed size</u>			<u>Weighted average</u>		
		<u><100</u>	<u>100-299</u>	<u>300+</u>	<u>Sample</u>	<u>Discharge</u>	<u>Hospital</u>
Age (years)	Underpaid	0.0	0.0	0.0	0.0	0.0	0.0
	Overpaid	71.4	75.6	73.7	73.9	74.1	73.1
Sex (% male)	Underpaid	0.0	0.0	0.0	0.0	0.0	0.0
	Overpaid	40.0	25.0	0.0	25.0	11.6	28.8
LOS (days)	Underpaid	0.0	0.0	0.0	0.0	0.0	0.0
	Overpaid	4.4	10.4	7.7	8.0	8.6	6.9
Payment (\$)	Underpaid	0.0	0.0	0.0	0.0	0.0	0.0
	Overpaid	6856	7382	7147	7174	7221	7075
Mortality (%)	Underpaid	0.0	0.0	0.0	0.0	0.0	0.0
	Overpaid	0.0	0.0	0.0	0.0	0.0	0.0

Appendix D-1: DRG 154 hospital department making error

Coding department errors [Percent]	Bed size			Total	Weighted average		
	<100	100-299	300+		Sample	Discharge	Hospital
Urban	2[100.0]	7 [100.0]	3 [100.0]	12	[100.0]	[100.0]	[100.0]
Rural	3[100.0]	1 [100.0]	0 [100.0]	4	[100.0]	[100.0]	[100.0]
Teaching	2[100.0]	5 [100.0]	2 [100.0]	9	[100.0]	[100.0]	[100.0]
Non-teaching	3[100.0]	3 [100.0]	1 [100.0]	7	[100.0]	[100.0]	[100.0]
Profit	2[100.0]	1 [100.0]	0 [100.0]	3	[100.0]	[100.0]	[100.0]
Nonprofit	3[100.0]	7 [100.0]	3 [100.0]	13	[100.0]	[100.0]	[100.0]
Total	5[100.0]	8 [100.0]	3 [100.0]	16	[100.0]	[100.0]	[100.0]

100% = no billing department errors.

Appendix D-2: DRG 154 hospital department making error comparison

Percent of errors		Bed size			Weighted average		
		<100	100-299	300+	Sample	Discharge	Hospital
Urban	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	89.2	88.8	90.6	89.7	89.7	89.3
Rural	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	94.5	95.8	90.6	94.5	93.3	94.3
Teaching	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	91.7	92.6	89.2	90.3	90.9	91.6
Non-teaching	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	93.5	90.2	92.3	92.2	91.7	92.2
Profit	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	86.0	92.4	81.8	89.3	86.6	87.4
Nonprofit	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	94.3	90.3	90.9	92.1	91.3	92.5
Total	DRG 154	100.0	100.0	100.0	100.0	100.0	100.0
	All DRGs	93.5	90.7	90.6	91.7	91.2	92.1

Appendix D-3: DRG 154 hospital department making error by patient demography

		<u>Bed size</u>			<u>Weighted average</u>		
		<u><100</u>	<u>100-299</u>	<u>300+</u>	<u>Sample</u>	<u>Discharge</u>	<u>Hospital</u>
Age (years)	Billing	0.0	0.0	0.0	0.0	0.0	0.0
	Coding	71.4	75.6	73.7	73.9	74.3	73.1
Sex (% male)	Billing	0.0	0.0	0.0	0.0	0.0	0.0
	Coding	40.0	25.0	0.0	25.0	11.6	28.8
LOS (days)	Billing	0.0	0.0	0.0	0.0	0.0	0.0
	Coding	4.4	10.4	7.7	8.0	8.6	6.9
Payment (\$)	Billing	0.0	0.0	0.0	0.0	0.0	0.0
	Coding	6856	7382	7147	7174	7221	7074
Mortality (%)	Billing	0.0	0.0	0.0	0.0	0.0	0.0
	Coding	0.0	0.0	0.0	0.0	0.0	0.0

Appendix E-1: DRG 154 coding error reasons

Number	Bed size			Total	[Percent]
	<100	100-299	300+		
Mis-specification	0	2	0	2	[12.5]
Principal diagnosis	0	2	0	2	[12.5]
Miscoding	0	1	1	2	[12.5]
Principal diagnosis	0	1	0	1	[6.3]
Secondary diagnosis	0	1	0	1	[6.3]
Procedure	4	4	2	10	[62.5]
Other	1	0	0	1	[6.3]
Total	5	8	3	16	[100.0]

Appendix E-2: DRG 154 coding error reasons by hospital demography

Number [Percent]	Mis-specification	Miscoding	Other
<100 beds	0 [0.0]	4 [80.0]	1 [20.0]
100-299 beds	2 [25.0]	6 [75.0]	0 [0.0]
300+ beds	0 [0.0]	3 [100.0]	0 [0.0]
Urban	2 [16.7]	10 [83.3]	0 [0.0]
Rural	0 [0.0]	3 [75.0]	1 [25.0]
Teaching	2 [22.2]	7 [77.8]	0 [0.0]
Nonteaching	0 [0.0]	6 [85.7]	1 [7.7]
Profit	0 [0.0]	3 [100.0]	0 [0.0]
Nonprofit	2 [15.4]	10 [76.9]	1 [7.7]
Total	2 [12.5]	13 [81.3]	1 [6.3]

Appendix E-3: DRG 154 coding error reasons comparison

Percent of errors		Bed size			Weighted average		
		<100	100-299	300+	Sample	Discharge	Hospital
Mis-specification	DRG 154	0.0	25.0	0.0	12.5	9.5	8.2
	All DRGs	49.8	44.9	49.4	48.1	47.8	48.1
Miscoding	DRG 154	80.0	75.0	100.0	81.3	89.4	81.5
	All DRGs	10.4	14.3	11.4	11.9	12.3	11.8
Resequencing	DRG 154	0.0	0.0	0.0	0.0	0.0	0.0
	All DRGs	31.0	24.9	24.3	27.1	25.8	28.0
Other	DRG 154	20.0	0.0	0.0	6.3	1.1	10.3
	All DRGs	6.7	15.9	14.9	12.8	13.8	11.0

Appendix E-4: DRG 154 coding error reasons by patient demography

	Mis-specification	Miscoding	Other
Age (years)	59.5	76.7	67.0
Sex (% male)	50.0	23.1	0.0
LOS (days)	17.5	6.9	3.0
Payment (\$)	9235	6938	6107
Mortality (%)	0.0	0.0	0.0

Appendix F-1: DRG 154 corrected relative weights

Relative weight	Bed size			Average
	<100	100-299	300+	
<u>Average</u>				
Paid	2.6621	2.6621	2.6621	2.6621
Corrected	2.2942	2.1194	2.4333	2.2823
Difference	0.3679	0.5427	0.2288	0.3798
<u>Total</u>				
Paid	66.5525	66.5525	66.5525	66.5525
Corrected	57.3550	52.9850	60.8325	57.0575
Difference	9.1975	13.5675	5.7200	9.4950

Appendix F-2: DRG 154 corrected reimbursement

\$	Bed size			Average
	<100	100-299	300+	
<u>Average</u>				
Paid	6,982	7,560	7,818	7,453
Corrected	6,017	6,019	7,146	6,389
Difference	965	1,541	672	1,063
<u>Total</u>				
Paid	174,541	189,012	195,443	186,318
Corrected	150,419	150,480	178,646	159,737
Difference	24,121	38,532	16,798	26,582
Overpayment rate [%]	[13.8]	[20.4]	[8.6]	[13.4]

* Discharge weighted.

Appendix F-3: DRG 154 projected cost of errors

Fiscal Year	Reimbursement (\$ million)	Overpayment (\$ million)
1984	216.5	28.9
1985	315.1	42.1
1986	367.3	49.1
1987	381.4	51.0
1988 est.	456.8	61.0
1989 est.	511.5	68.3
1990 est.	566.2	75.6

*Overpayment calculated as 13.4 percent of reimbursement.
Estimates based on linear regression.*

Appendix G-1: Correct MDC for discharges mis-assigned to DRG 154

Number	Bed size			Total	[Percent]
	<100	100-299	300+		
MDC 06: Digestive System	5	7	3	15	[93.8]
MDC 20: Alcohol and Drugs	0	1	0	1	[6.3]
Total	5	8	3	16	[100.0]

Appendix G-2: Correct DRG for discharges mis-assigned to DRG 154

Number	Bed size			Total	[Percent]
	<100	100-299	300+		
174: Gastrointestinal hemorrhage	0	2	1	3	[18.8]
177: Uncomplicated peptic ulcer	0	1	1	2	[12.5]
182: Esophagitis, gastroenteritis, & miscellaneous digestive disorders	2	2	1	5	[31.3]
Subtotal	2	5	3	10	[62.5]
Other DRGs	3	3	0	6	[37.5]
Total	5	8	3	16	[100.0]

Appendix G-3: ICD-9-CM procedure codes for discharges mis-assigned to DRG 154

	Number	[Percent]
Esophagogastroduodenoscopy	11	[30.6]
Esophageal biopsy	3	[8.3]
Brush biopsy	17	[47.2]
Colonoscopy	1	[2.8]
Colon excision	1	[2.8]
Trans-abdominal endoscopy	1	[2.8]
Incisional hernia	1	[2.8]
Psychiatric drug treatment	1	[2.8]
Total	36	[100.0]

Appendix G-4: ICD-9-CM procedure codes for DRG 154 discharges

	Number	[Percent]
Esophageal surgery	13	[15.3]
Gastrectomy	44	[51.8]
Vagotomy	12	[14.1]
Ulcer surgery	11	[12.9]
Small intestine surgery	1	[1.2]
Herniorrhaphy	4	[4.7]
Total	85	[100.0]

Appendix G-5: DRG 154 errors billing for an open biopsy

	Number	[Percent]
Open biopsy claimed	1	[6.3]
No open biopsy claimed	15	[93.7]
Total	16	[100.0]

Appendix H-1: DRG 154 clinical incidents

Number [Rate]	Bed size			Total	Weighted average		
	<100	100-299	300+		Sample	Discharge	Hospital
Unnecessary admissions	0 [0.0]	1 [4.0]	1 [4.0]	2	[2.7]	[3.8]	[1.9]
Poor quality of care	2 [8.0]	0 [0.0]	1 [0.0]	3	[4.0]	[0.4]	[4.1]
Premature discharges	0 [0.0]	0 [0.0]	0 [0.0]	0	[0.0]	[0.0]	[0.0]

Appendix H-2: DRG 154 clinical incidents comparison

Rate		Bed size			Weighted average		
		<100	100-299	300+	Sample	Discharge	Hospital
Unnecessary admissions	DRG 154	0.0	4.0	4.0	2.7	3.8	1.9
	All DRGs	12.6	10.1	8.9	10.5	10.0	11.3
Poor quality of care	DRG 154	8.0	0.0	0.0	4.0	0.4	4.1
	All DRGs	11.4	5.1	3.5	6.6	5.5	8.1
Premature discharge	DRG 154	0.0	0.0	0.0	0.0	0.0	0.0
	All DRGs	2.1	0.8	0.4	1.1	0.9	1.4